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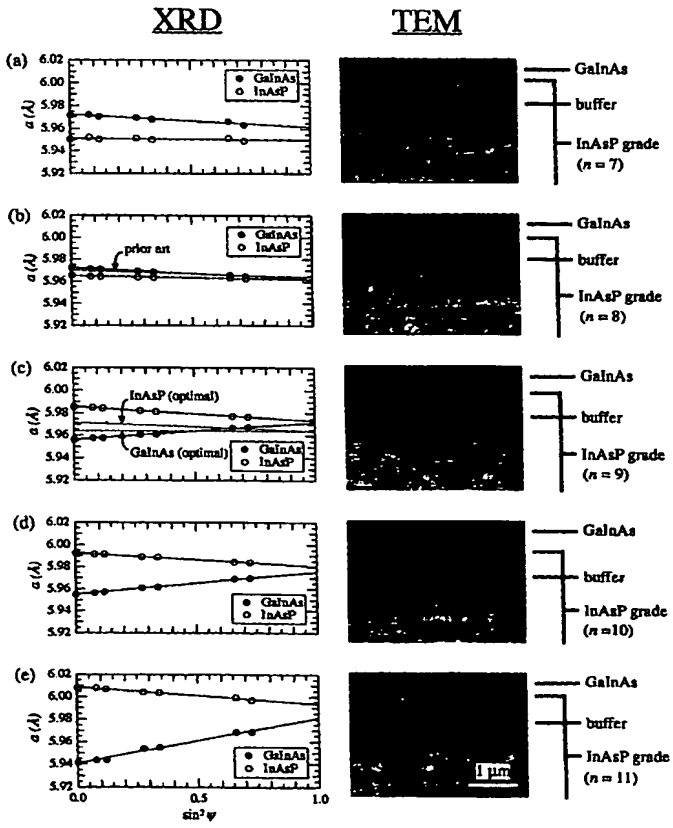
*[Continued on next page]*

(54) Title: METHOD FOR ACHIEVING DEVICE-QUALITY, LATTICE-MISMATCHED, HETEROEPITAXIAL ACTIVE LAYERS




(57) Abstract: A method is provided for achieving device-quality active layers in lattice-mismatched-heteroepitaxial systems. The method eliminates strain and dislocations resulting from lattice mismatch with respect to the substrate (12) of a heteroepitaxial active layer (14). The optimized heterostructure comprises a substrate (12), a compositionally step-graded region terminated with a buffer layer (14), an intermediate region (16), an active layer (18), and a capping layer (20). Concepts of the invention are demonstrated in double heterostructures containing the semiconductor alloys $Ga_xIn_{1-x}As$ and $InAs_yP_{1-y}$.

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**Declarations under Rule 4.17:**

— *as to the identity of the inventor (Rule 4.17(i)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

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**A. CLASSIFICATION OF SUBJECT MATTER**
IPC(7) : C30B 25/02; 25/04
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**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 117/84,

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
STN (hcaplus, japio, inspec, uspatall)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | KAE-NUNE, et al. Strain Relaxation of Ga0.2In0.8As and InAsO.5P0.5 Layers Grown On InP Substrate For 1.6 to 2.4 .mu.m spectral range GaxIn1-xAs/InAsyP10y/InP Photodiodes Application; Conf. Proc. - Int. Conf. Indium Phosphide Relat. Mater., 5th (1993), pages 135-138 (Abstract Only) | 1-49 |

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